

71
38

Conjunctivitis Nodosa, with Histological Examination.

By G. E. de SCHWEINITZ, M.D., and
E. A. SHUMWAY, M.D.,
PHILADELPHIA, PENN.

[Reprinted from Transactions American Ophthalmological Society, 1904.]

CONJUNCTIVITIS NODOSA, WITH HISTOLOGICAL EXAMINATION.

By G. E. De SCHWEINITZ, A.M., M.D.,

AND

E. A. SHUMWAY, M.D.,

PHILADELPHIA, PA.

As is well known, the first case of ophthalmia nodosa, a name suggested by Saemisch, was described by Pagenstecher¹ in 1883 before the Heidelberg Ophthalmological Society. Since this time numerous cases have been reported, in many of which positive proof has been given that the condition was caused by irritation of the hairs of certain species of caterpillar, which had found lodgment in the conjunctiva, cornea, or iris. We are particularly indebted for studies of this subject to Baas, Wagenmann, Hillemanns, Krüger, Hanke, Lawford, Stargardt, and others, and a complete analysis of the literature of this subject in condensed manner will be found in the works of Ginsberg,² Greeff,³ and J. Herbert Parsons.⁴ It does not seem, therefore, necessary to do more than mention these authors, in whose writings full bibliography will be found. In our own country we have not noted the reports of many examples of this affection, although George Knapp⁵ has described three cases, and Colburn one case. Our own case is as follows:

¹ Klin. Monatsbl. f. Augenheilk., XXI, 1883.

² Grundriss der pathologischen Histologie des Auges, Berlin, 1903, p. 68.

³ Pathologische Anatomie des Auges, p. 70.

⁴ The Pathology of the Eye, Vol. I, Part I, London, 1904, p. 84.

⁵ American Journal of Ophthalmology, Vol. XIX, 1897, p. 247.

Theresa C., a negro girl, aged fifteen, an inmate of the Asylum for Colored Orphans in Philadelphia, came to the hospital of the University of Pennsylvania on the 20th of July, 1903, for relief from an inflammatory condition of the left eye.

History. — The patient stated that while playing in the yard attached to the asylum a few days prior to her entrance into the hospital her eye became inflamed, owing, as she expressed it, to "something getting into the eye." At that time she gave no intimation of what that something might have been. The girl was a well-formed negress, healthy in all respects, and having no ordinary intimations of general disease.

Examination. — Vision of O.D. 6/9, the ocular structures normal, and the depreciation in vision due to slight refractive error. Vision of O.S. 6/12; the conjunctiva of the lids, especially in the lower retrotarsal fold, was slightly congested and velvety in appearance. There was marked pericorneal injection downward and inward, and an area of patchy congestion with faint nodes at the lower and inner portion of the bulbar conjunctiva. The case books do not record any more accurate description than the one that we have given at this time, and the eye was treated with the usual antiseptic lotions, the patient reporting with a good deal of irregularity during the next six weeks, and apparently without benefit from whatever treatment was applied. The case was then referred to me for more particular examination, and the following conditions were evident: The cornea and iris were unaffected and the deeper media clear. Downward and inward on the bulbar conjunctiva were a number of flattened, grayish-yellow nodules, between which was a marked congestion of the conjunctival and episcleral vessels. Twenty-seven nodules could be differentiated, those directly in the center of the collection being somewhat confluent and assuming a crescentic and circular appearance. The whole condition strongly suggested tubercle of the conjunctiva, and, indeed, this was the tentative diagnosis at the time, as there was not then the least suspicion of the true nature of the case.

The patient was admitted to the wards of the hospital on the 20th of September, 1903, chloroformed, and the greater portion

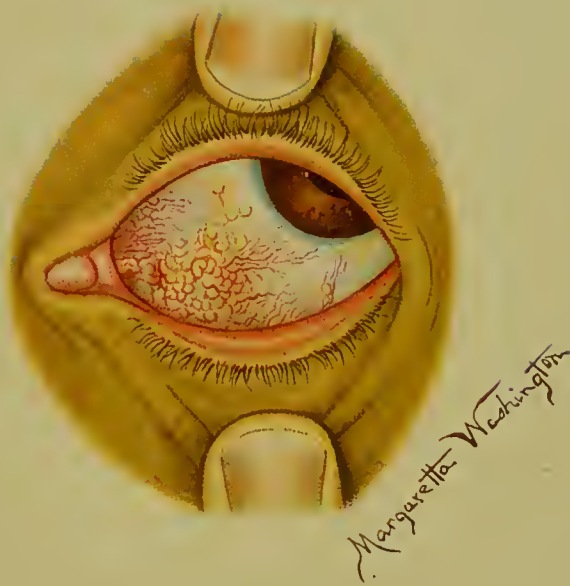


FIG. 1.—CONJUNCTIVITIS NODOSA.



of the nodules excised, those failing to come away with the strip of conjunctiva thus removed being touched with the actual cautery. The surface was dusted with iodoform, the eye bandaged, and the patient treated as after an ordinary operation. The healing was kind and the patient was dismissed in a few days with a good deal of congestion remaining, but no distinct nodules. She came somewhat irregularly to the dispensary, and then disappeared. We have ascertained that subsequently she went to another hospital, where the nature of the case was not suspected, and where, with some local treatment, which included the usual antiseptic lotions and dilatation of the punctum, the remaining congestion disappeared.

Microscopic Examination.—A portion of the strip of conjunctiva was introduced into the anterior chamber of a rabbit's eye through a corneal incision. The remainder was placed in formalin and imbedded in paraffin. The wound in the rabbit's eye healed promptly, and the eye showed very little reaction. The bit of tissue lay on the iris below, and was slowly absorbing, when the rabbit unfortunately developed a purulent infection of the air passages three weeks afterward, which commenced in the nose and produced a purulent pleuritis and pericarditis, to which the animal succumbed within two days. The infection proved to be due to the bacillus pyocaneus and was, of course, accidental, and not connected with the inoculation of the eye. The eyeball was removed, fixed in formalin, and imbedded in celloidin. Sections passing through the tissue introduced into the anterior chamber show that this has been partially included in the iris tissue, and is reduced to a condensed mass of connective tissue. The eye itself shows very little reaction. The iris contains a moderate round-cell infiltration, but there is no sign of miliary nodules, so that the tubercular character of the tissue may be excluded.

The sections of the original strip of conjunctiva reveal the presence of numerous nodules beneath its surface. The conjunctival epithelium is very greatly thickened and contains leucocytes. Beneath the epithelium the tissue is composed of coarse bundles of connective tissue, which contain a great many round

cells and numerous distended blood-vessels. The nodules measure about .25 mm. in cross diameter and from .4 to .6 mm. in their long diameter. The outer portion of each is composed of a layer of spindle cells and round cells arranged concentrically, outside of which the tissue is condensed into a capsule. The interior consists of epithelioid cells, between which there is considerable intercellular substance. Each nodule contains a number of giant cells, the nuclei of which are irregularly distributed through the body of the cell instead of being marginal. Directly in the center of a certain number of the nodules is the section of a hair. When this is evident in longitudinal position, as may be seen in the accompanying drawing, or in the microscopic sections which are herewith presented, it consists of a long cylinder with moderately refracting walls, and in the center contains a somewhat brownish-yellow broken material. Irregular crosshatching of flat sections is visible. In one section, at least, what at first appears to be a notching of the edge is really a slight, spike-like prolongation into the surrounding tissue, and represents, we think, the remnant of the long spines which form so conspicuous a component of caterpillar hairs. Each hair is surrounded by a mantle of small round cells. No micro-organisms could be discovered, and the nodes must therefore be regarded as typical foreign body tubercles, produced by the presence in the tissue of the fine hairs. The histological appearances which we have described closely correspond to those already recorded by Wagenmann, Krüger, Hanke, and others, although we have not noted anywhere in the drawings which accompany the papers of these authors so typical an example of the hair shaft as we here picture, nor have we seen anywhere described an appearance which suggests at least the remnant of the spines on caterpillar hairs.

If we come to consider the previously reported cases of this affection, the records of which may be found in the literature to which we have already made reference, and particularly in Mr. Parsons' admirable résumé of the whole subject, we find that ophthalmia nodosa, or, as Wagenmann prefers to call it, pseudo-tuberculosis of the conjunctiva, has been caused by the irritation

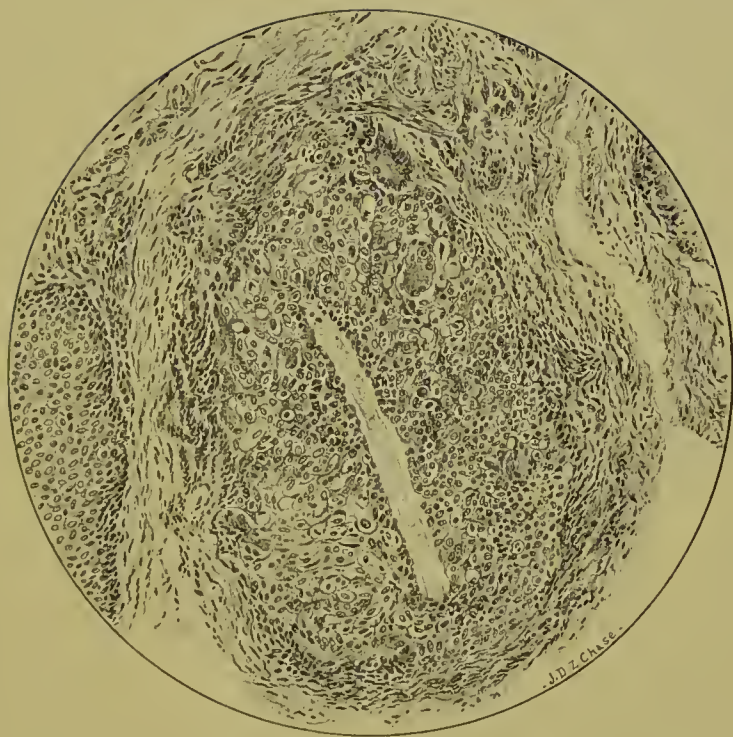


FIG. 2.—MICROSCOPIC APPEARANCE OF SECTION OF A CONJUNCTIVAL NODULE. IN ITS CENTER IS A CATERPILLAR HAIR, SURROUNDED BY ROUND CELLS AND GIANT CELLS; EXTERNALLY, SPINDLE CELLS AND CAPSULE.

of certain species of caterpillar, particularly *Lasiocampa* or *Bombyx* (*B. rubi*, *B. pini*.), *Liparis* (*L. monacha*, *L. dispar*.), etc.; other species, *e. g.*, *Cnethocampa* (*C. processionæ*), also cause conjunctival irritation, but it rarely becomes so severe as with the other species, nor are the deeper parts of the eye (iris, etc.) affected (Baas, Wagenmann). Particularly interesting studies of the caterpillar species concerned in this affection have been made by Mr. Lawford with the aid of Lord Walsingham. The affection has been seen as early as the month of June, but more commonly appears in August, September, and October, when caterpillars are more common and are at the period of their greatest activity. Our case began in July. As is well known, the nodules in this disease may be present in the conjunctiva, episclera, and even in the iris, but most often are found in the bulbar conjunctiva in the position in which they are shown in the accompanying watercolor by Miss Washington. In general terms, they resemble very much real tubercle of the conjunctiva, not only on external examination, but in minute microscopic investigation. The hairs when imbedded in the conjunctiva are surrounded by round-celled infiltration, which is a conspicuous element in the sections we present. Frequently numerous giant cells and lymphocytic infiltration are present, and the giant cells are of the foreign body variety. Spindle cells, which we also have described, have been noted in a number of instances, and sometimes a fibrous capsule seems to be present, as, for example, in one of Krüger's sections, as it may also be seen in those which we exhibit.

There is much difference of opinion as to whether the irritation is mechanical, or whether it is due to some constituent of the hairs. Stargardt thinks that the first irritation is mechanical, but that this is followed by a chemical irritation to which the pseudo-tuberculosis formation is due. As is well known, formic acid is present to a considerable extent in the hairs of caterpillars. The hairs, encouraged by frequent rubbing of the lids, can travel, base forward, very deep, but probably owing to the presence of the spines, which come off from the hair shafts at

acute angles, are prevented from making a return journey. They may penetrate the cornea, enter the iris, and there form the nodules which have been described. It is probable that they may even reach the choroid, if we may trust a case reported by Reis. Bacterial infection seems absent. Micro-organisms have not been found, either in our own, or in other cases in which search was made for them. Experiments on animals by Krüger and others have not led to definite results, and implantation of the excised tissue in the anterior chamber of a rabbit has not led to the development of similar nodules, as is evident from our own experiments. Greeff maintains that according to his researches the caterpillar hairs do not produce this condition by virtue of a mechanical irritation, but by reason of the presence of a toxic substance, and further declares that if the hairs are dried and then introduced into the tissues the nodules do not develop. Parsons believes, however, that the innocuousness of dried hairs requires confirmation.

A somewhat similar disease clinically resembling trachoma has been described by Markus¹ as the result of the implantation of plant hairs, and it is possible that some of the reported cases of ophthalmia nodosa may have been due to this type of irritation, and not to caterpillar hairs.

Referring again to our own case, when the diagnosis by virtue of the microscopic examination became evident, the interesting problem presented itself, whether we could prove or not what species of caterpillar had produced this conjunctivitis. The diagnosis was not made until long after the caterpillar season, and therefore a search in this respect had to be postponed until the present time. Therefore, a few days ago one of us (Dr. de Schweinitz) went to the yard in which the children of the Colored Orphanage are accustomed to play, and make a search for the caterpillars then present. The date of this visit was July 5th. The following interesting facts were developed: Children are much accustomed to playing with caterpillars, and are in the habit, as one of the children stated, "of scaring the young ones

¹ Zeitschr. f. Augenheilk., 1899, II, p. 34.

by throwing caterpillars at them. The caterpillar which is most used in this playful proceeding I found, or rather, the children found it for me, and is here exhibited. It is the *Spilosoma virginica*, or the yellow, woolly bear caterpillar. Three other varieties are common at this season in the region named, the *Orgyia leucostigma*, that is, the tussock moth larva, and the *Empretia stimulea*, or the saddleback caterpillar of common parlance. One last variety, which the children of the home call the doctor caterpillar, we could not find and therefore cannot give its true name. In determining these varieties of caterpillars we are indebted to Dr. Henry Skinner, the distinguished editor of the *Entomological News* and a member of the Academy of Natural Sciences of Philadelphia. He has examined the sections and believes there is no doubt that the hairs are caterpillar hairs, but said that no one could positively determine from what species they came with no more to guide him in his investigations than the hairs which are imbedded in the tissues. He suggested that as the saddleback caterpillar is notoriously irritating and produces even on the skin a stinging sensation followed by large welts, this might be the caterpillar that had produced the mischief. We do not think so, however, because the children are well acquainted with this caterpillar and call it the nettle caterpillar, know that it stings, and never touch it. The *Orgyia leucostigma*, or tussock moth larva, belongs to the group of the Bombyces of the family Liparidæ, and, as we have seen from the European investigations, the Liparians may cause conjunctival irritation, but they apparently do not produce the severe types of ophthalmia nodosa, certainly not those in which the iris is involved, and probably not such as we have exhibited today. Now the yellow, woolly bear caterpillar, or the *Spilosoma virginica*, belongs to a family of the Bombyces called the Arctiidæ, derived from a Greek word meaning bear, so given on account of the thick hairs which cover their body. This caterpillar, which the children call the pussy, is used in their sports and they constantly throw it at one another. We could not positively prove that the child who had the conjunctivitis had been struck with this caterpillar, although this

was the opinion of the children who knew about her ocular afflictions.

While this case does no more than add another example of this interesting affection, it is, so far as we know, the first American instance of the disease in which, in all probability, the species of caterpillar concerned has been identified. Doubtless, however, the hairs of any caterpillar of the various species named could produce an analogous if not exactly identical disease. It is further interesting because the implantation of the tissue into the anterior chamber of the rabbit was negative in its results.

Finally, we should call attention to an observation of Markus, namely, that there is only one certain criterion upon which a differential diagnosis between a nodular conjunctivitis caused by caterpillar hairs and by plant hairs can be made. According to him, longitudinal and cross sections of plant hairs show strong polarization, which is not the case with the caterpillar hairs. We have submitted our sections to the professor of physics in the University of Pennsylvania, who has examined them in this respect and reports the entire absence of any signs of polarization. We have therefore, we think, definitely shown that the case reported should be properly classified as a conjunctivitis nodosa due to the introduction of caterpillar hairs, in all probability the hairs of the *spilosoma virginica*, into the conjunctiva of this patient.